



Paiute Tribe Data Summary

August 13, 2002

Erik W. Leppo

Initial Status of Data

- In Excel
- Each year on a separate page
- Data laid out in a matrix
 - Organisms in rows and stations in columns

Data Problems Encountered

- Each year had a separate taxa list resulting in 144 unique names, reduced to 106 after QC.
 - Multiple spellings and misspellings of some taxa. Used ITIS and Merritt and Cummins 3rd edition as references.
 - Some non-benthic organisms included (fish).
 - These were removed for analysis purposes.
- Site Ids and Names did not always match
 - Started with 31 unique combinations, reduced to 14 combinations. Many were just typos or mismatched columns.

Data Maintenance

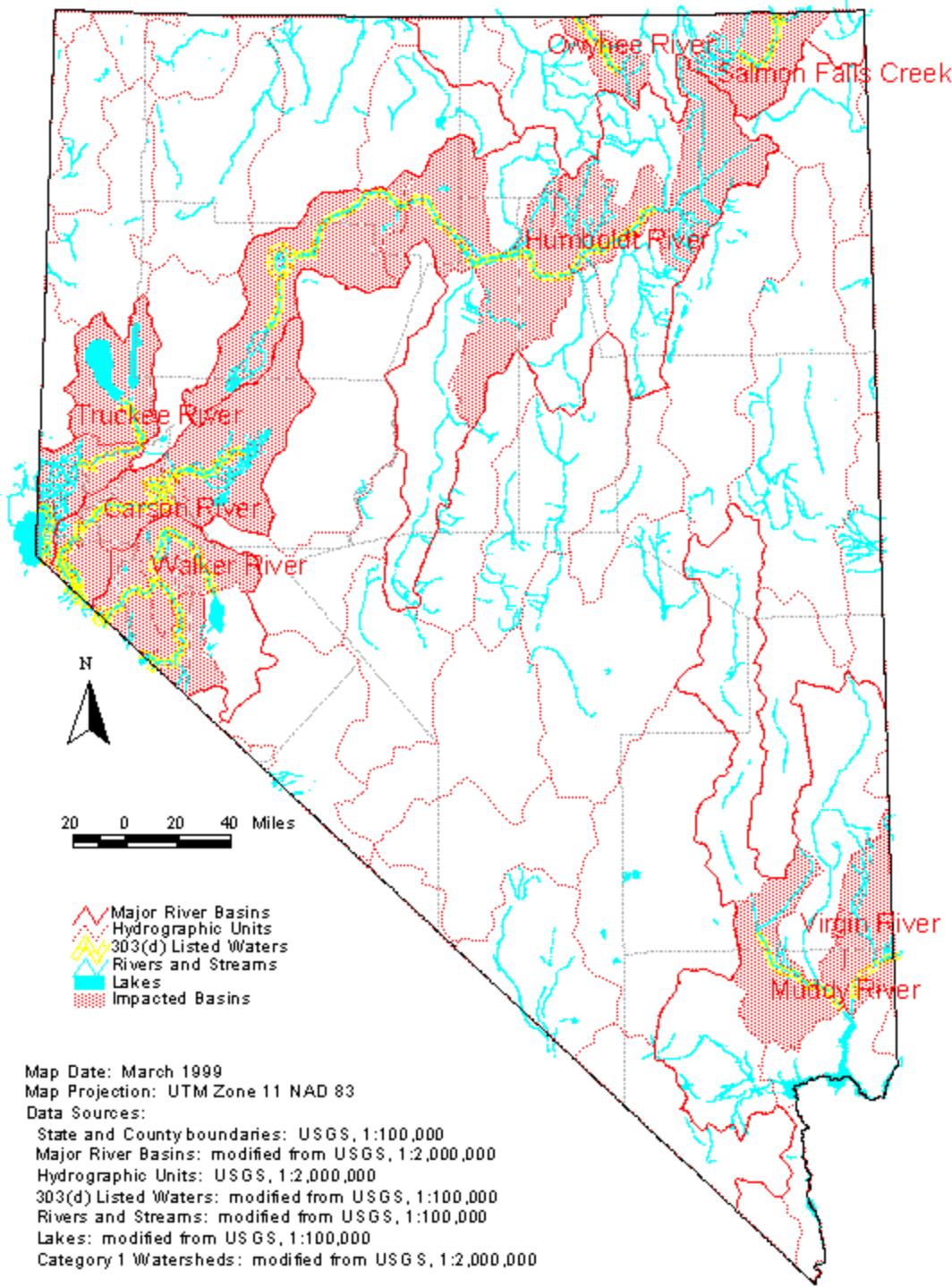
- Taxa information
 - Was not included with the data.
 - Populated FFG, TV, & habit from RBP 2nd edition. Used values from Idaho as primary data source.
 - Populated phylogenetic hierarchy from USEPA 1990 draft.

Collection Methods Review

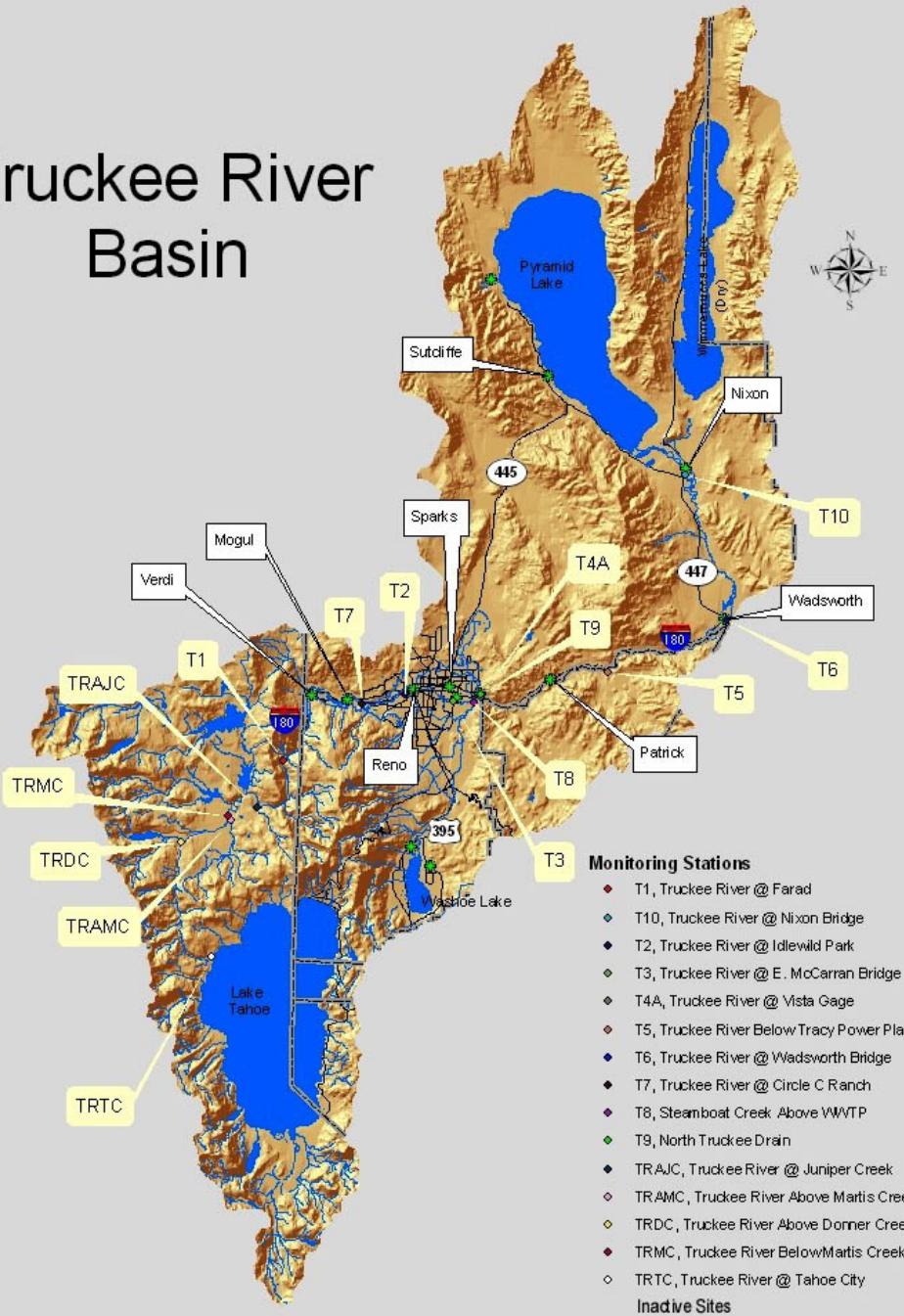
- 10 years of data collected over a span of 20 years, 1981-2000.
 - No data collected 1982-1988, 1991, & 1997-1998
- 2 collection methods
 - Surber (8 years)
 - Kicknet (2 years, 1992 & 1993)
 - Differing number of replicates each year
 - Anywhere from 1-4.
- 3 counting/identification methods
 - Total counts (6 years)
 - Presence/Absence (2 years, 1994 & 1995)
 - Estimated counts (2 years, 1992 & 1993)

Area of Collection

- All of the data was collected on the Paiute Tribe's Pyramid Lake Reservation



Truckee River Basin



Year	Sampling Method	Counting Method
1981	Surber	Total
1982-1988	NO DATA	
1989	Surber	Total
1990	Surber	Total
1991	NO DATA	
1992	Kicknet	Estimated
1993	Kicknet	Estimated
1994	Surber	Presence/Absence
1995	Surber	Presence/Absence
1996	Surber	Total
1997	NO DATA	
1998	NO DATA	
1999	Surber	Total
2000	Surber	Total

Station Names and ID Codes

- Abandoned House (AH)
- Canyon (CN)
- Dead Ox (DO)
- Fred John's Ranch (FJR)
- I-80 Bridge (I80)
- Little Nixon (LNX)
- Marble Bluff Dam (MBD)
- Nixon Bridge (NB)
- Numana Dam (ND)
- Lower Nixon (NIX)
- Numana Wetland (NW)
- Painted Rock (PR)
- S bar S Ranch (SS)
- Wadsworth Bridge (WB)

Number of Sample Collections by Method

- Ben-K-Est
 - Kicknet
 - Estimated Count
- Ben-S-PA
 - Surber
 - Presence/Absence Count
- Ben-S-Ttl
 - Surber
 - Total Count
- 10 Sample Collections (Sample Years)

StationID	Ben-K-Est	Ben-S-PA	Ben-S-Ttl
AH		2	2
CN	2	2	5
DO	2	2	5
FJR			3
I80			4
LNX	2	2	4
MBD	2	2	5
NB			2
ND			1
NIX	2	2	4
NW			2
PR		2	
SS		2	1
WB	2	2	3
Total	12	18	41

Analysis Scenarios

- Scenario 1
 - All sites / all sample years
 - Use only taxa richness metrics to avoid influences of different counting methods
 - Rejected - too much variability in methods
- Scenario 2
 - Subset of samples with same methods
 - All metrics
 - Accepted - Used this method but refined focus

Sample Selection

- Based upon number of samples for each method decided to examine only Surber samples with total counts
 - 6 sample years
 - 1981, 1989, 1990, 1996, 1999, and 2000
 - Only 1 site (PR) without at least 1 sample
 - Reduces variability of collection and counting methods
- Decided to further refine analysis by examining only the last 3 sample years
 - 1996, 1999, and 2000
 - These will have the most consistent methods and environmental influences

Metric Selection

- EDAS calculates ~70 metrics
- To narrow focus decided to look at the metrics that are most recommended by the RBPs
 - 14 metrics
 - Chapter 7, Table 7-1
 - <http://www.epa.gov/owow/monitoring/rbp/ch07b.html>

EDAS Query Name	EDAS Field in EDAS Query	Metric Title
MBCom-IndesShannonWeiner	Shan_base_e, Shan_base_2, Shan_base_10	Shannon-Weiner Index
MBCom-Percent Amphipoda	AmphPct	Percent Amphipoda
MBCom-Percent Bivalvia	BivalPct	Percent Bivalvia
MBCom-Percent Chironomidae	ChiroPct	Percent Chironomidae
MBCom-Percent Coleoptera	ColeoPct	Percent Coleoptera
MBCom-Percent Corbicula	CorbPct	Percent Corbicula
MBCom-Percent CricotopusChironomusOfChironomidae	CrCh2ChiPct	Percent Cricotopus+Chironomus of Chironomidae
MBCom-Percent CrustaceaMollusca	CrMolPct	Percent Crustacea+Mollusca
MBCom-Percent Diptera	DipPct	Percent Diptera
MBCom-Percent Ephemeroptera	EphemPct	Percent Ephemeroptera
MBCom-Percent EPT	EPTPct	Percent Ephemeroptera+Plecoptera+Trichoptera
MBCom-Percent Gastropoda	GastrPct	Percent Gastropoda
MBCom-Percent Isopoda	IsoPct	Percent Isopoda
MBCom-Percent NonInsect	NonInPct	Percent Non-Insect
MBCom-Percent Odonata	OdonPct	Percent Odonata
MBCom-Percent Oligochaeta	OligoPct	Percent Oligochaeta
MBCom-Percent OrthocladiinaeOfChironomidae	Orth2ChiPct	Percent Orthocladiinae of Chironomidae
MBCom-Percent Plecoptera	PlecoPct	Percent Plecoptera
MBCom-Percent Tanytarsini	TanytPct	Percent Tanytarsini
MBCom-Percent TanytarsiniOfChironomidae	Tnyt2ChiPct	Percent Tanytarsini of Chironomidae
MBCom-Percent Trichoptera	TrichPct	Percent Trichoptera
MBHab-Percent Burrower	BrrwrPct	Percent Burrower
MBHab-Percent Climber	ClmbrPct	Percent Climber
MBHab-Percent Clinger	ClngrPct	Percent Clinger
MBHab-Percent Sprawler	SprwlPct	Percent Sprawler
MBHab-Percent Swimmer	SwmmrPct	Percent Swimmer
MBHab-Taxa Burrower	BrrwrTax	Burrower Taxa
MBHab-Taxa Climber	ClmbrTax	Climber Taxa
MBHab-Taxa Clinger	ClngrTax	Clinger Taxa
MBHab-Taxa Sprawler	SprwlTax	Sprawler Taxa
MBHab-Taxa Swimmer	SwmmrTax	Swimmer Taxa
MBRic-Taxa Chironomidae	ChiroTax	Chironomidae Taxa
MBRic-Taxa Coleoptera	ColeoTax	Coleoptera Taxa
MBRic-Taxa CrustaceaMollusca	CrMolTax	Crustacea+Mollusca Taxa
MBRic-Taxa Diptera	DipTax	Diptera Taxa
MBRic-Taxa Ephemeroptera	EphemTax	Ephemeroptera Taxa
MBRic-Taxa EPT	EPTTax	Ephemeroptera+Plecoptera+Trichoptera Taxa
MBRic-Taxa Oligochaeta	OligoTax	Oligochaeta Taxa
MBRic-Taxa Orthocladiinae	OrthoTax	Orthocladiinae Taxa

EDAS Query Name	EDAS Field in EDAS Query	Metric Title
MBRic-TaxaPlecoptera	PlecoTax	Plecoptera Taxa
MBRic-TaxaPteronarcys	PteroTax	Pteronarcys Taxa
MBRic-TaxaTanytarsini	TanytTax	Tanytarsini Taxa
MBRic-TaxaTotal	TotalTax	Total Taxa
MBRic-TaxaTrichoptera	TrichTax	Trichoptera Taxa
MBT ol-BioticIndexBeck	BeckBI	Beck's Biotic Index
MBT ol-BioticIndexHilsenhoff	HBI	Hilsenhoff Biotic Index
MBT ol-BioticIndexNorthCarolina	NCBI	North Carolina Biotic Index
MBT ol-PercentBaetidaeOfEphemeroptera	Baet2EphPct	Percent Baetidae of Ephemeroptera
MBT ol-PercentDominant01Taxon	Dom01Pct	Percent Dominant Taxon
MBT ol-PercentHydropsychidaeOfEPT	Hyd2EPTPct	Percent Hydropsychidae of Ephemeroptera+Plecoptera+Trichoptera
MBT ol-PercentHydropsychidaeOfTrichoptera	Hyd2TriPct	Percent Hydropsychidae of Trichoptera
MBT ol-PercentIntolerant	IntolPct	Percent Intolerant Individuals
MBT ol-PercentTolerant	TolerPct	Percent Tolerant Individuals
MBT ol-TaxaIntolerant	IntolTax	Intolerant Taxa
MBT ol-TaxaIntolerantMollusca	InMolTax	Intolerant Mollusca Taxa
MBT ol-TaxaTolerant	TolerTax	Tolerant Taxa
MBTro-PercentCollector	CllctPct	Percent Collector
MBTro-PercentFilterer	FiltrPct	Percent Filterer
MBTro-PercentPredator	PredPct	Percent Predator
MBTro-PercentScraper	ScrapPct	Percent Scraper
MBTro-PercentShredder	ShredPct	Percent Shredder
MBTro-TaxaCollector	CllctTax	Collector Taxa
MBTro-TaxaFilterer	FiltrTax	Filterer Taxa
MBTro-TaxaPredator	PredTax	Predator Taxa
MBTro-TaxaScraper	ScrapTax	Scraper Taxa
MBTro-TaxaShredder	ShredTax	Shredder Taxa
MBVol-PercentMultivoltine	MltVolPct	Percent Multivoltine
MBVol-PercentSemivoltine	SemVolPct	Percent Semivoltine
MBVol-PercentUnivoltine	UniVolPct	Percent Univoltine
MBVol-TaxaSemivoltine	SemVolTax	Semivoltine Taxa
MBMis-IndividualsTotal	TotalInd	Total Individuals
MBT ol-IndexSimpson	D	Simpson Taxonomic Index
MBCom-IndexBrillouin	HB_e	Brillouin Taxonomic Index
MBCom-IndexMargalef	D_Mg	Margalef Taxonomic Diversity Index
MBCom-IndexEvenness	Evenness	Taxonomic Evenness

RBP Recommended Metrics

Category	Metric	Predicted response to increasing perturbation
Richness measures	Total No. taxa	Decrease
	No. EPT taxa	Decrease
	No. Ephemeroptera Taxa	Decrease
	No. Plecoptera Taxa	Decrease
	No. Trichoptera Taxa	Decrease
Composition measures	% EPT	Decrease
	% Ephemeroptera	Decrease
Tolerance & Intolerance measures	No. of Intolerant Taxa	Decrease
	% Tolerant Organisms	Increase
	% Dominant Taxon	Increase
Feeding measures	% Filterers	Variable
	% Grazers and Scrapers	Decrease
Habit measures	Number of Clinger Taxa	Decrease
	% Clingers	Decrease

Number of Samples

- Methods (1 of 3)
 - Surber sampler & Total Counts
- Sample Collection Years (3 of 10)
 - 1996
 - 9 Stations
 - 1999
 - 7 Stations
 - 2000
 - 6 Stations
- Stations (13 of 14)
 - 6 Stations with 1 sample collection
 - 5 Stations with 2 sample collections
 - 2 Stations with 3 sample collections

Graphing

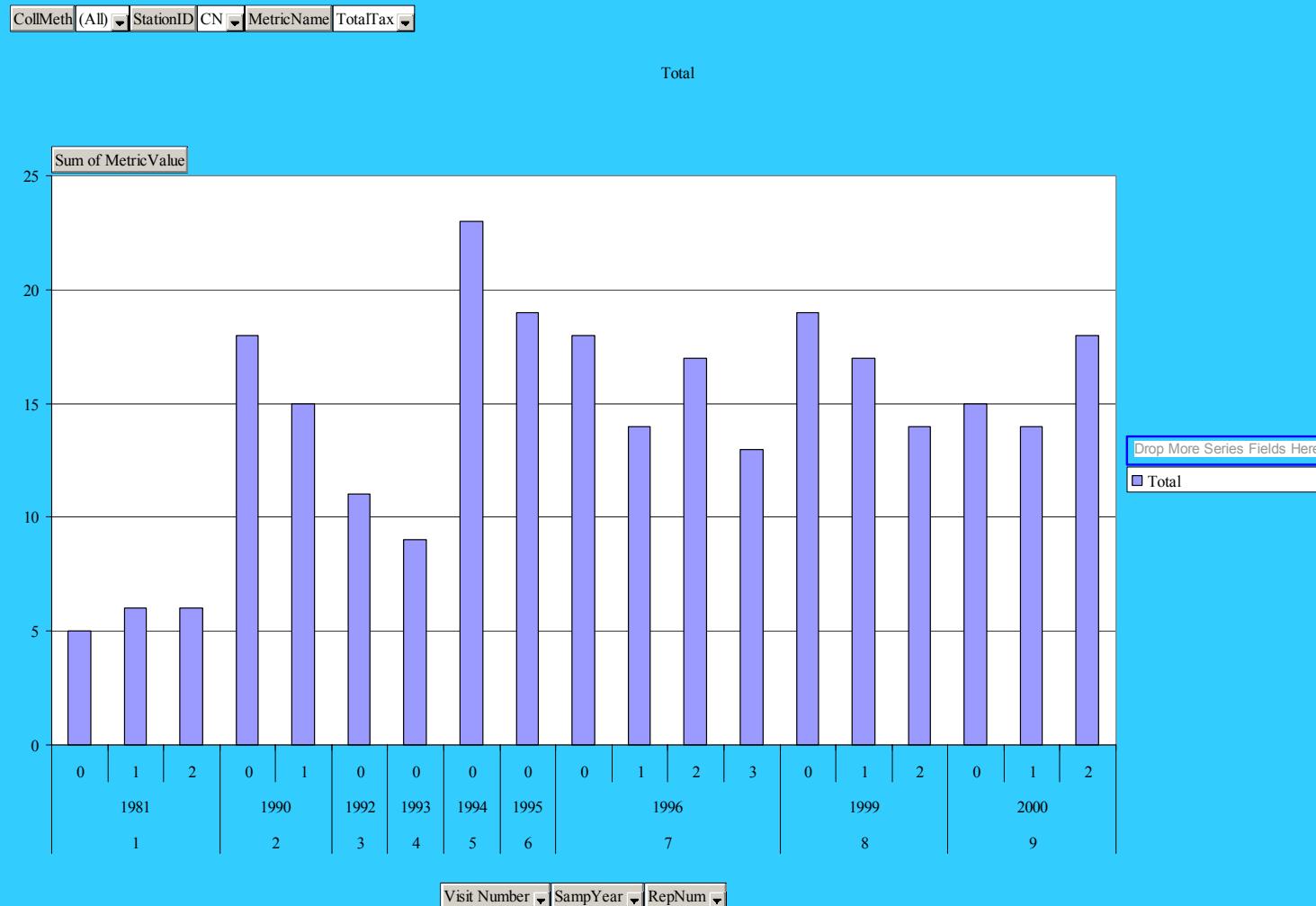
- Used 2 methods
 - Excel
 - Included in MS Office
 - Statistica
 - Separate statistical package
 - <http://www.statsoft.com/>
- Bar charts in Excel seemed to give the best picture
 - Required the transformation of data in Excel from a matrix to a list
 - Then used the Pivot Chart function

Matrix vs. List

StationID	ActivityID	BenSamp	RepNum	CollDate	SampYear	CollMeth	Shan_e	Shan_2	Shan_10	AmphPct	BivalPct	ChiroPct	ColeoPct	
MBD	MBD_1981	1	0	6/23/1981	1981	Ben-S-Ttl	1.118642	1.613859	0.48582	0	0	43.33333	0	
MBD	MBD_1981	1	1	6/23/1981	1981	Ben-S-Ttl	1.698022	2.449729	0.737442	1.923077	7.051282	28.20513	0	
MBD	MBD_1981	1	2	6/23/1981	1981	Ben-S-Ttl	0.812287	1.171883	0.352772	1.424501	0.2849	77.49288	0.2849	
NIX	NIX_1981	2	0	6/30/1981	1981	Ben-S-Ttl	0.94352	1.361212	0.409766	0.662252	0	48.34437	0	
NIX	NIX_1981	2	1	6/30/1981	1981	Ben-S-Ttl	0.852158	1.229404	0.370088	0	0	44.31579	0	
NIX	NIX_1981	2	2	6/30/1981	1981	Ben-S-Ttl	1.197146	1.727117	0.519914	0	0	36.81481	0	
StationID	ActivityID	BenSampID	RepNum	CollDate	SampYear	CollMeth	MetricName	MetricValue	MetricType					
CN	CN_1981	3	0	7/1/1981	19	MBD	MBD_1981	1	0	6/23/1981	1981	Ben-S-Ttl	Shan_e	1.11864214
CN	CN_1981	3	1	7/1/1981	19	MBD	MBD_1981	1	1	6/23/1981	1981	Ben-S-Ttl	Shan_e	1.698022497
CN	CN_1981	3	2	7/1/1981	19	MBD	MBD_1981	1	2	6/23/1981	1981	Ben-S-Ttl	Shan_e	0.81228706
DO	DO_1981	4	0	7/1/1981	19	MBD	MBD_1981	2	0	6/30/1981	1981	Ben-S-Ttl	Shan_e	0.943520045
DO	DO_1981	4	1	7/1/1981	19	NIX	NIX_1981	2	0	6/30/1981	1981	Ben-S-Ttl	Shan_e	0.852158234
DO	DO_1981	4	2	7/1/1981	19	NIX	NIX_1981	2	1	6/30/1981	1981	Ben-S-Ttl	Shan_e	1.197146432
FJR	FJR_1981	5	0	7/1/1981	19	NIX	NIX_1981	2	2	6/30/1981	1981	Ben-S-Ttl	Shan_e	1.571318913
FJR	FJR_1981	5	1	7/1/1981	19	CN	CN_1981	3	0	7/1/1981	1981	Ben-S-Ttl	Shan_e	0.860169669
FJR	FJR_1981	5	2	7/1/1981	19	CN	CN_1981	3	1	7/1/1981	1981	Ben-S-Ttl	Shan_e	0.784466913
LNX	LNX_1981	6	0	7/8/1981	19	CN	CN_1981	3	2	7/1/1981	1981	Ben-S-Ttl	Shan_e	1.512641616
LNX	LNX_1981	6	1	7/8/1981	19	DO	DO_1981	4	0	7/1/1981	1981	Ben-S-Ttl	Shan_e	1.423320109
LNX	LNX_1981	6	2	7/8/1981	19	DO	DO_1981	4	1	7/1/1981	1981	Ben-S-Ttl	Shan_e	1.380798522
I80	I80_1981	7	0	8/1/1981	19	DO	DO_1981	4	2	7/1/1981	1981	Ben-S-Ttl	Shan_e	1.240762066
I80	I80_1981	7	1	8/1/1981	19	FJR	FJR_1981	5	0	7/1/1981	1981	Ben-S-Ttl	Shan_e	1.87680466
I80	I80_1981	7	2	8/1/1981	19	FJR	FJR_1981	5	1	7/1/1981	1981	Ben-S-Ttl	Shan_e	1.098006554
FJR	FJR_1989	9	0	9/25/1989	19	LNX	LNX_1981	6	0	7/8/1981	1981	Ben-S-Ttl	Shan_e	1.369866047
MBD	MBD_1989	10	0	9/25/1989	19	LNX	LNX_1981	6	1	7/8/1981	1981	Ben-S-Ttl	Shan_e	0.494422858
NB	NB_1989	11	0	9/25/1989	19	LNX	LNX_1981	6	2	7/8/1981	1981	Ben-S-Ttl	Shan_e	1.365787853
NW	NW_1989	12	0	9/25/1989	19	I80	I80_1981	7	0	8/1/1981	1981	Ben-S-Ttl	Shan_e	1.502626214
WB	WB_1989	13	0	9/25/1989	19	I80	I80_1981	7	1	8/1/1981	1981	Ben-S-Ttl	Shan_e	1.13172199
I80	I80_1981	7	2	8/1/1981	1981	Ben-S-Ttl	Shan_e	1.746299999						
DO	DO_1989	8	0	9/25/1989	1989	Ben-S-Ttl	Shan_e	1.697811326						
FJR	FJR_1989	9	0	9/25/1989	1989	Ben-S-Ttl	Shan_e	1.400725613						
MBD	MBD_1989	10	0	9/25/1989	1989	Ben-S-Ttl	Shan_e	0.837834451						
NB	NB_1989	11	0	9/25/1989	1989	Ben-S-Ttl	Shan_e	1.628778416						
NW	NW_1989	12	0	9/25/1989	1989	Ben-S-Ttl	Shan_e	1.576480321						
WB	WB_1989	13	0	9/25/1989	1989	Ben-S-Ttl	Shan_e	1.033539651						

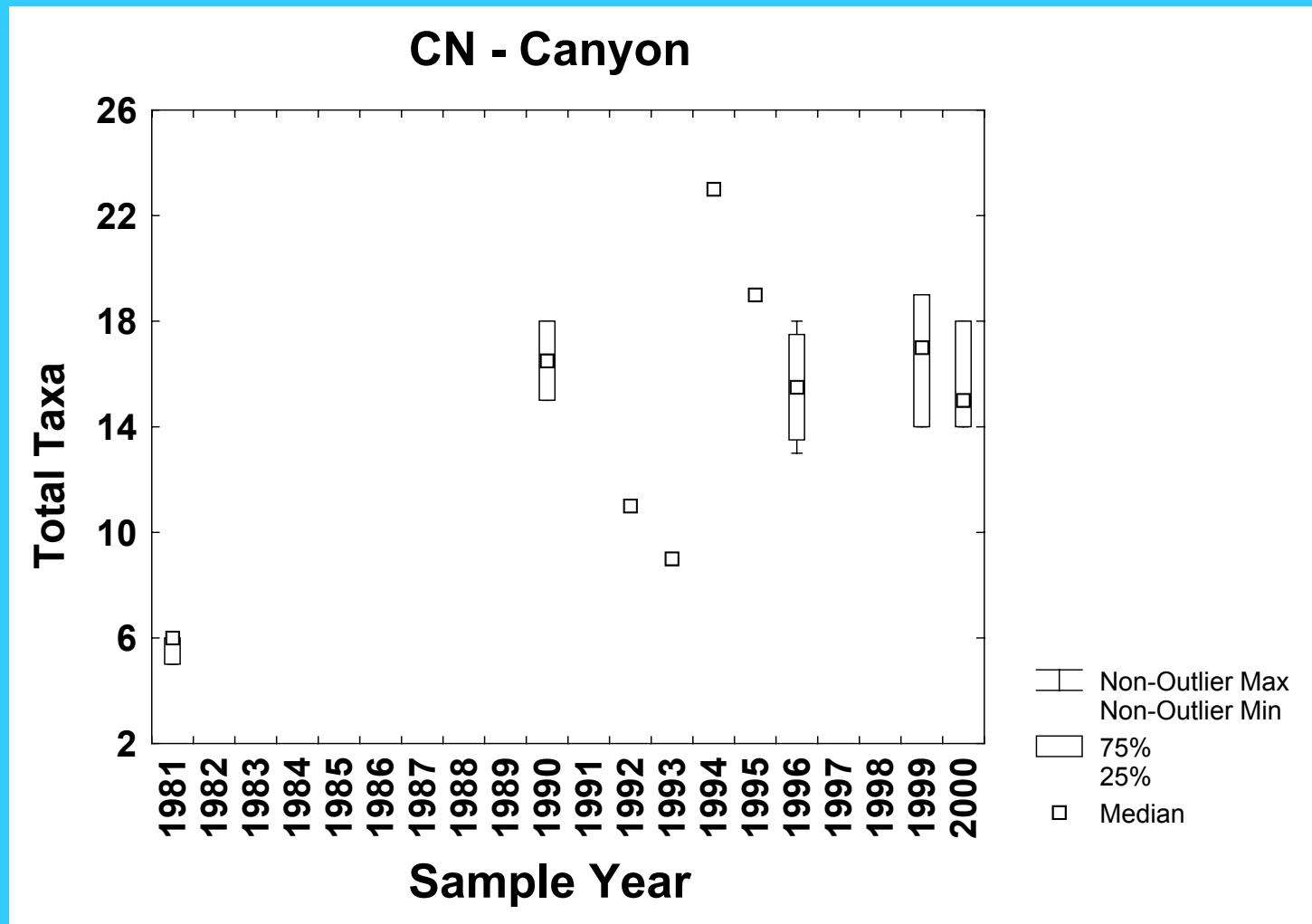
One Site over Time

Bar Chart - Excel



One Site over Time

Bow & Whisker Plot - Statistica



Graph Data

- Replicates averaged within Samples
- Samples average for 1996, 1999, & 2000
- 14 metrics – RBP Recommended
- 13 Stations

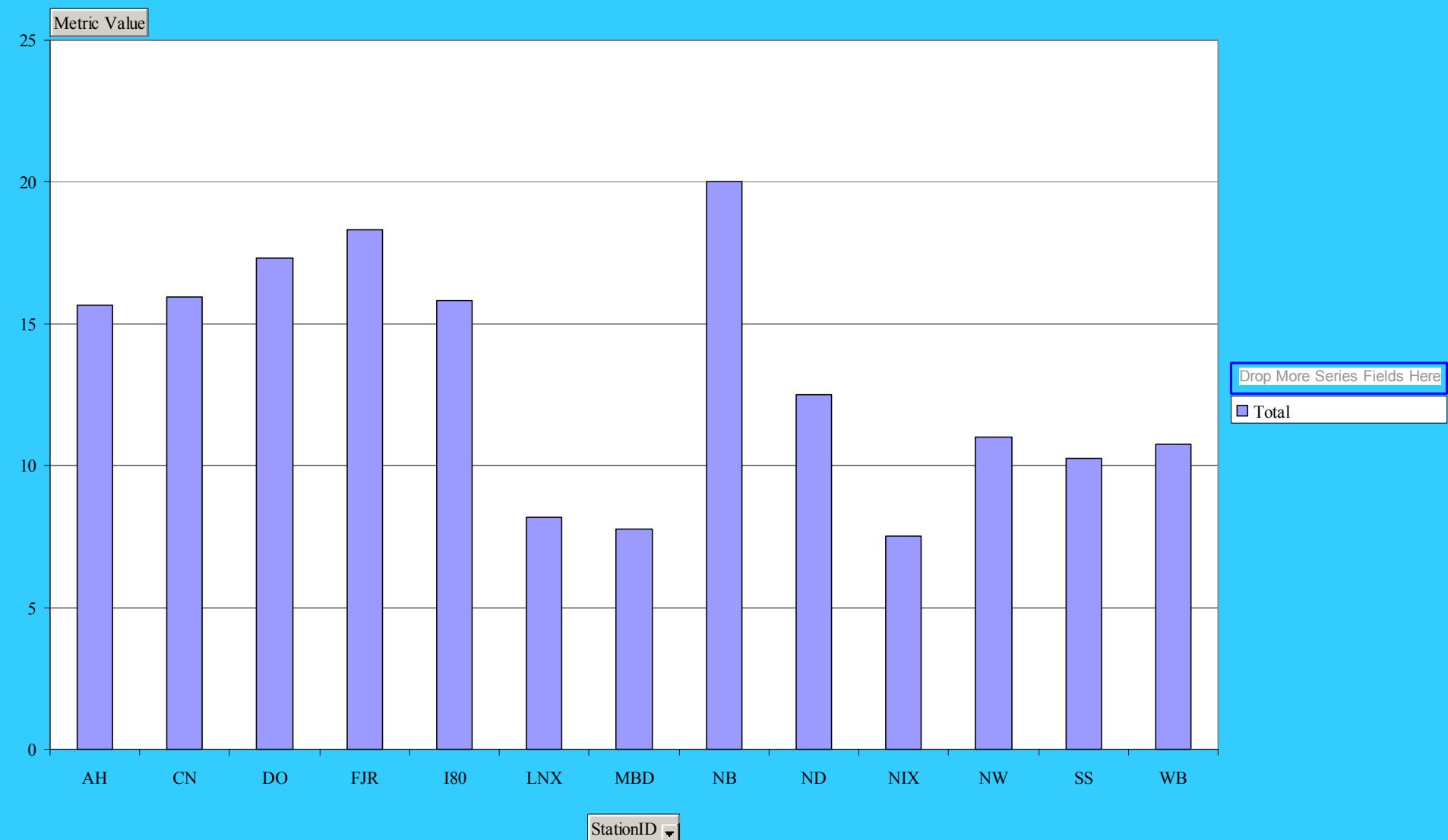
StationID	CollMethod	TotalTax	EPTTax	EphemTax	PlectoTax	TrichTax	EPTPct	EphemPct	IntlTax	TolerPct	Dom01Pct	FiltrPct	ScrapPct	ClingrTax	ClingrPct
AH	Ben-S-Ttl	15.7	7.7	4.7	0.9	2.2	79.4	43.8	2.0	2.3	38.8	34.9	1.4	1.8	8.2
CN	Ben-S-Ttl	15.9	6.8	3.9	0.6	2.3	61.5	38.0	1.6	5.4	45.1	31.4	3.1	1.6	0.8
DO	Ben-S-Ttl	17.3	8.5	4.2	1.0	3.3	80.0	58.8	2.5	2.0	55.3	20.3	1.5	1.7	1.4
FJR	Ben-S-Ttl	18.3	8.7	3.7	0.0	5.0	62.3	52.7	3.7	8.2	33.8	3.3	2.1	1.3	0.4
I80	Ben-S-Ttl	15.8	8.1	3.7	1.0	3.5	80.9	41.2	1.8	2.8	51.2	39.4	0.8	1.2	0.6
LNX	Ben-S-Ttl	8.2	4.0	2.0	0.5	1.5	37.6	23.9	1.0	2.0	65.1	14.1	0.7	1.0	7.2
MBD	Ben-S-Ttl	7.8	3.0	1.9	0.0	1.1	33.2	20.0	1.0	2.5	52.9	12.4	2.2	0.3	1.1
NB	Ben-S-Ttl	20.0	8.3	5.0	1.0	2.3	51.3	32.6	2.0	3.2	32.4	19.3	3.1	2.0	11.5
ND	Ben-S-Ttl	12.5	5.3	3.3	0.3	1.8	66.0	17.1	1.5	4.8	48.5	62.8	0.5	1.0	0.4
NIX	Ben-S-Ttl	7.5	4.0	2.8	0.0	1.2	38.3	22.5	0.8	0.7	19.0	17.7	2.5	1.7	6.8
NW	Ben-S-Ttl	11.0	5.8	3.8	0.3	1.8	68.0	60.1	2.8	2.2	32.0	10.9	1.1	1.3	25.7
SS	Ben-S-Ttl	10.3	6.5	4.0	1.0	1.5	80.8	42.0	1.8	0.6	35.7	33.8	0.7	1.8	11.6
WB	Ben-S-Ttl	10.8	6.5	4.8	0.5	1.3	66.8	42.7	2.0	1.1	43.3	23.5	1.0	1.8	8.9

RBP Recommended Metrics

Category	Metric	Predicted response to increasing perturbation
Richness measures	Total No. taxa	Decrease
	No. EPT taxa	Decrease
	No. Ephemeroptera Taxa	Decrease
	No. Plecoptera Taxa	Decrease
	No. Trichoptera Taxa	Decrease
Composition measures	% EPT	Decrease
	% Ephemeroptera	Decrease
Tolerance & Intolerance measures	No. of Intolerant Taxa	Decrease
	% Tolerant Organisms	Increase
	% Dominant Taxon	Increase
Feeding measures	% Filterers	Variable
	% Grazers and Scrapers	Decrease
Habit measures	Number of Clinger Taxa	Decrease
	% Clingers	Decrease

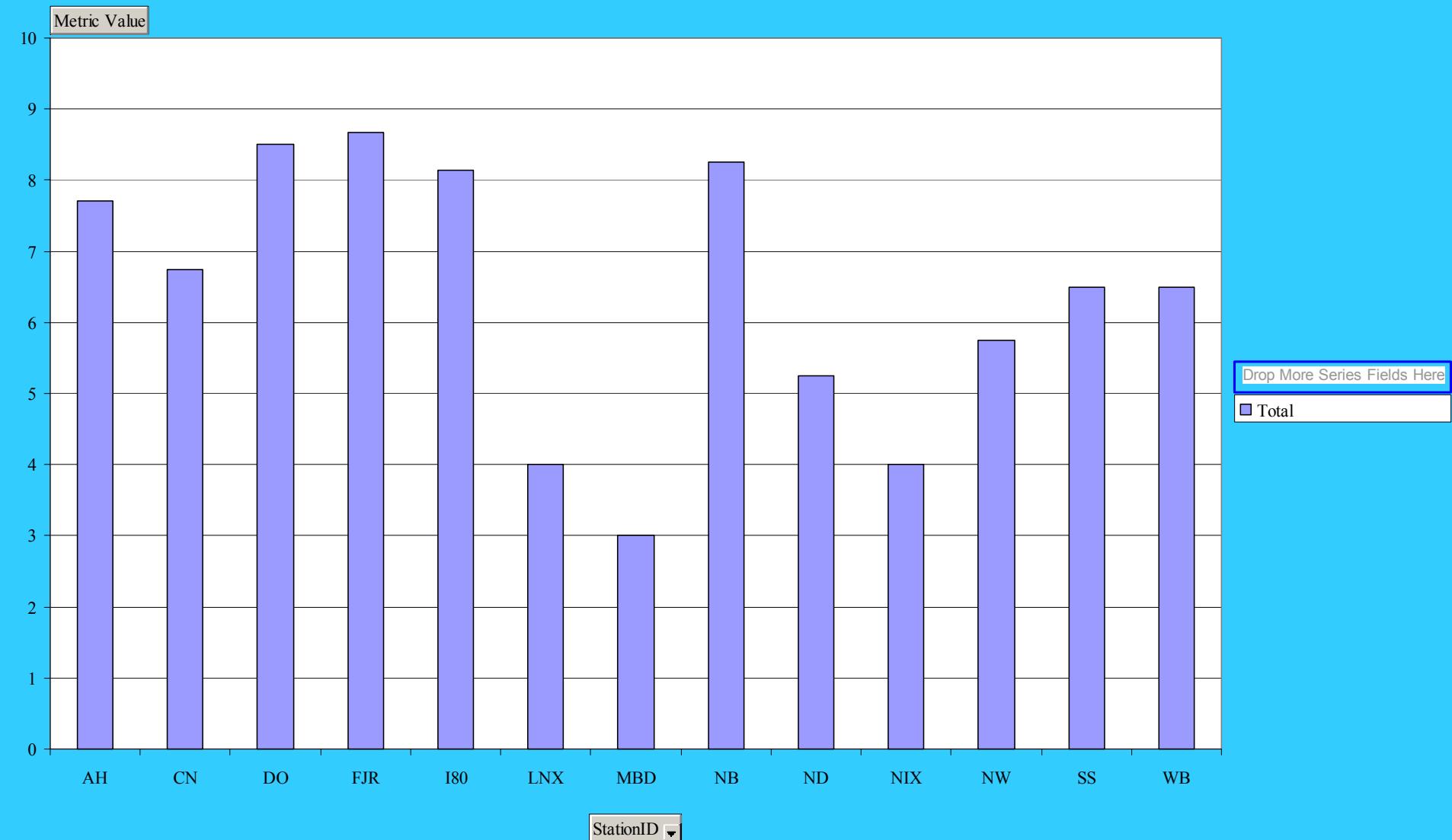
MetricName TotalTax ▾

Total



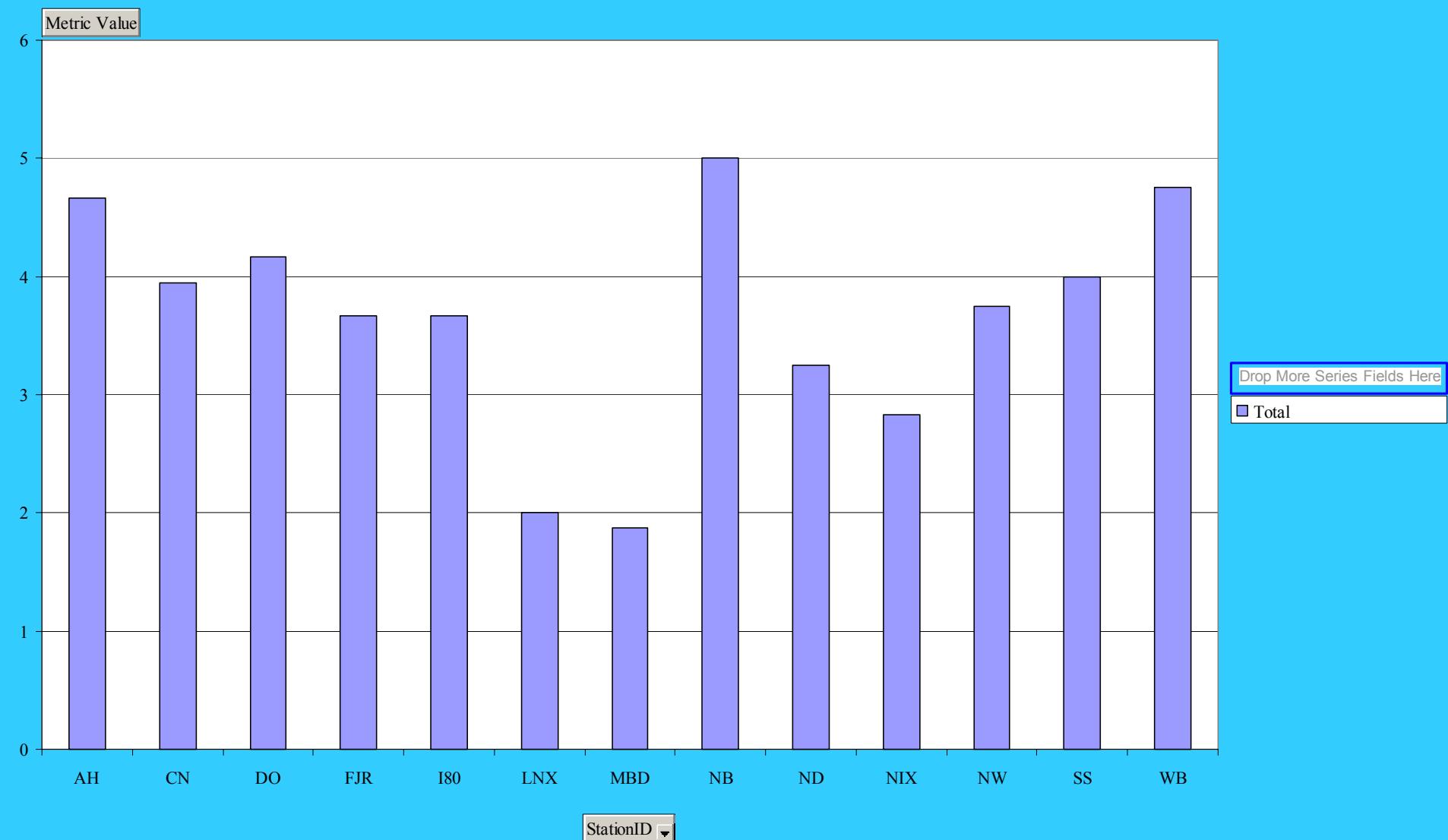
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Total



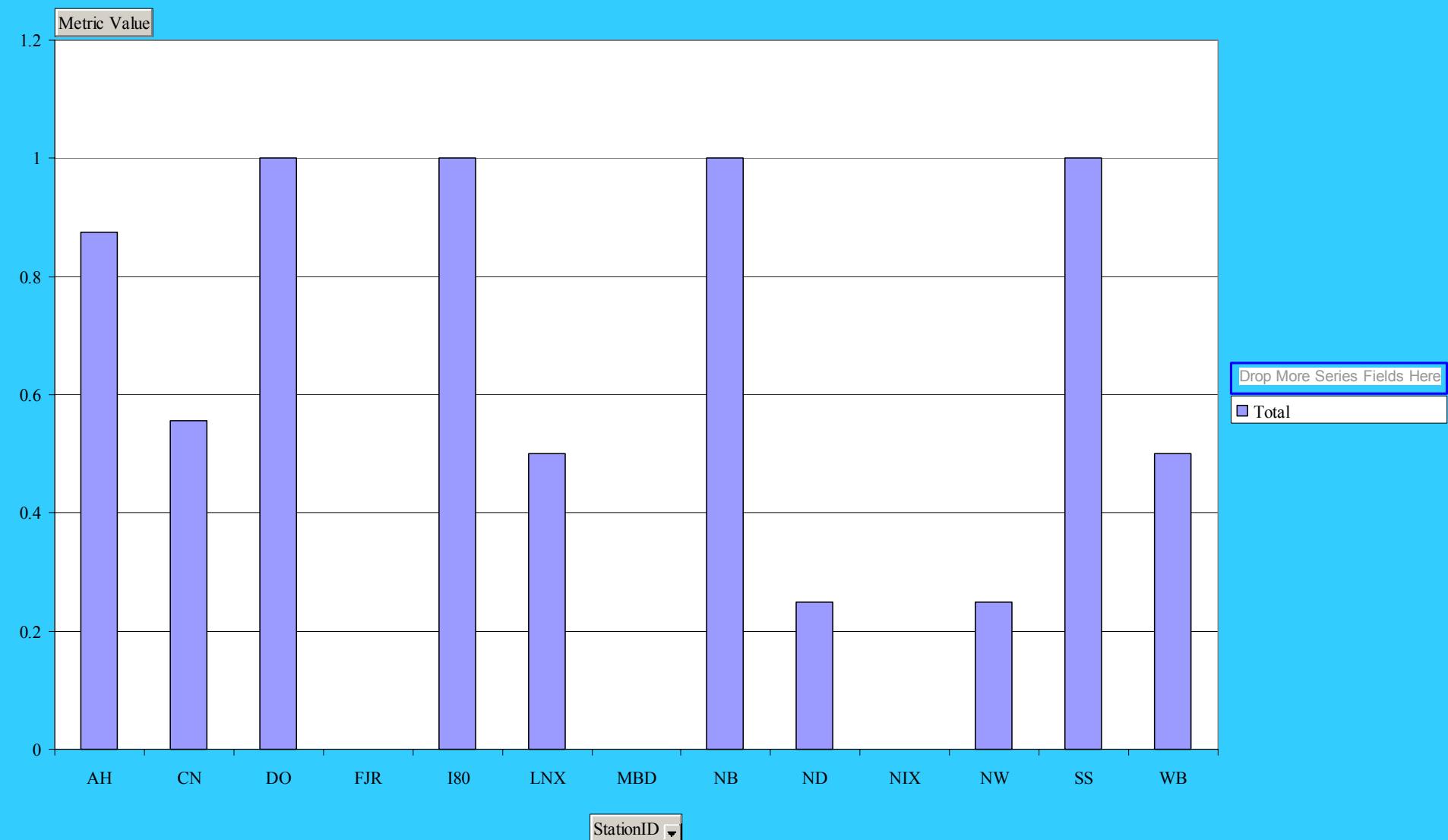
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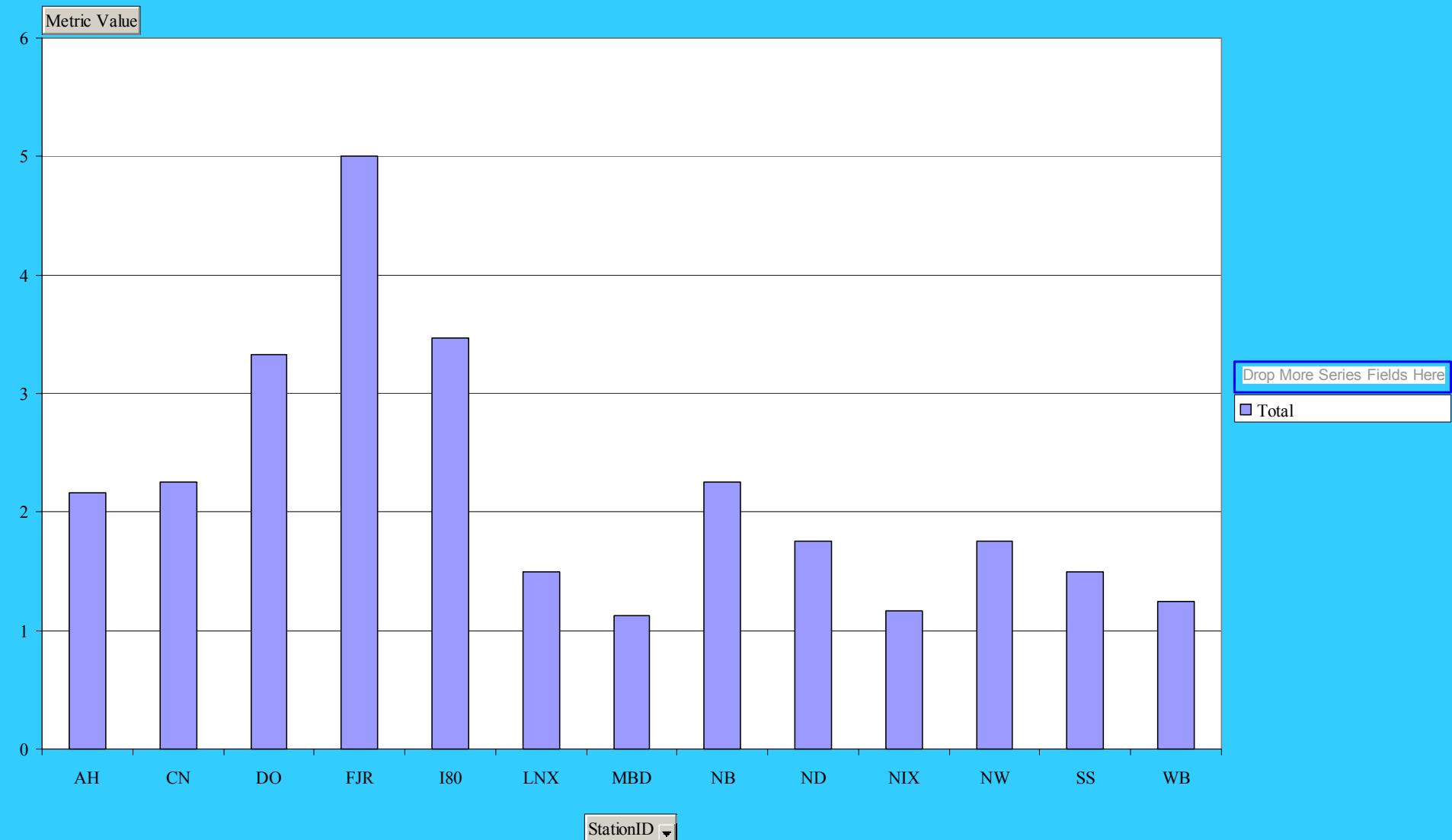
MetricName PlecoTax ▾

Total



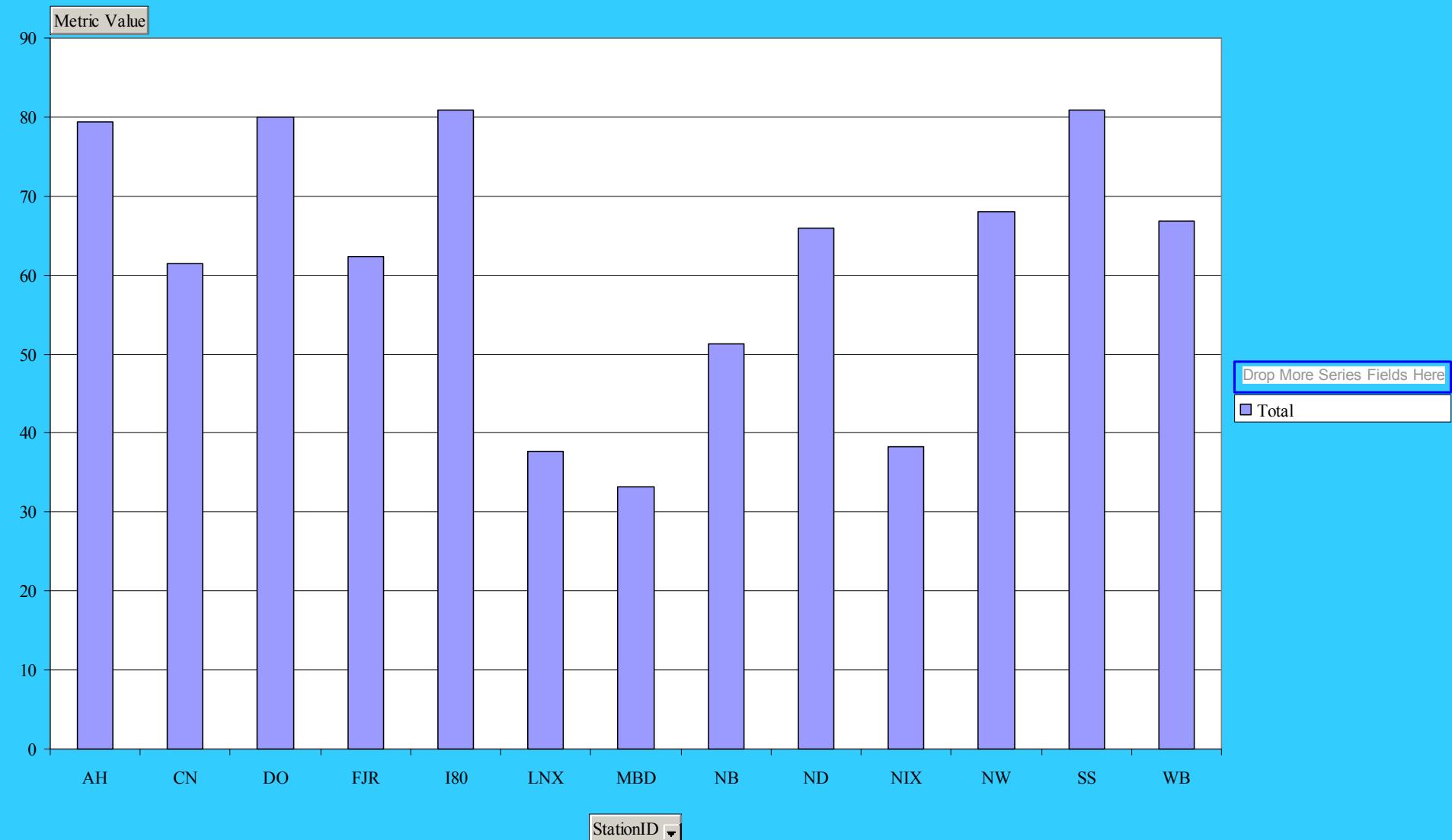
MetricName TrichTax ▾

Total



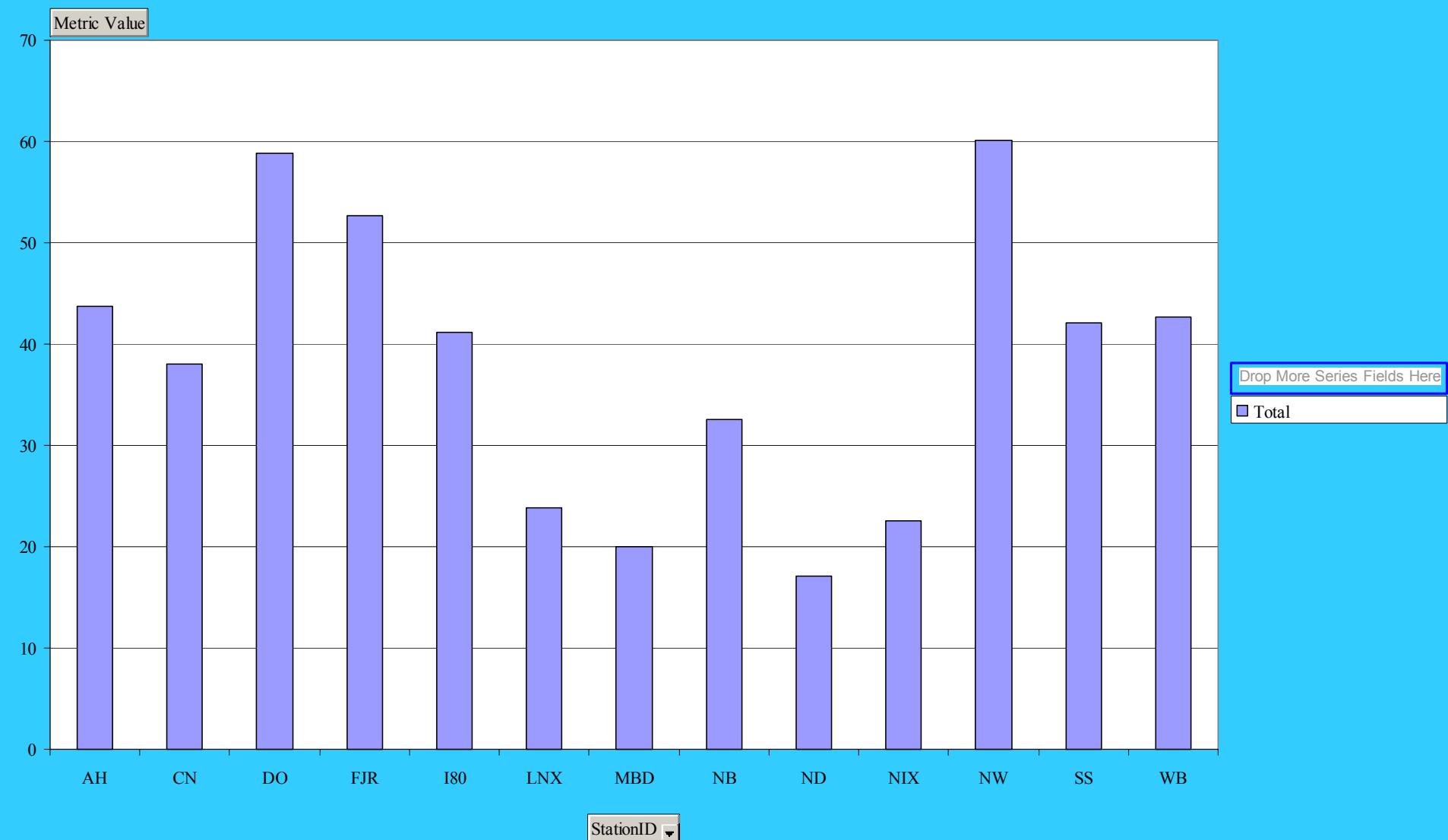
MetricName EPTPct ▾

Total



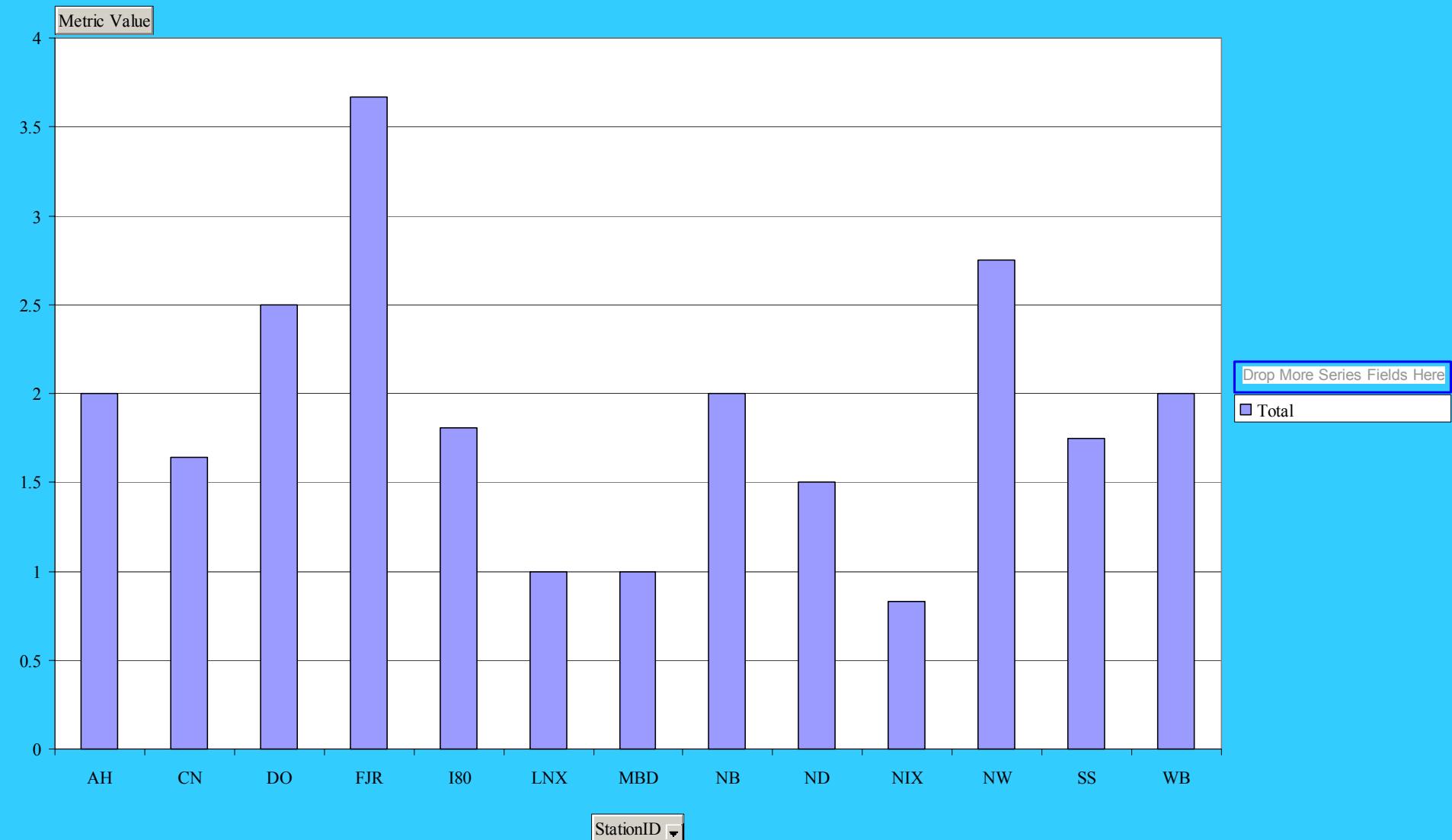
MetricName EphemPct ▾

Total



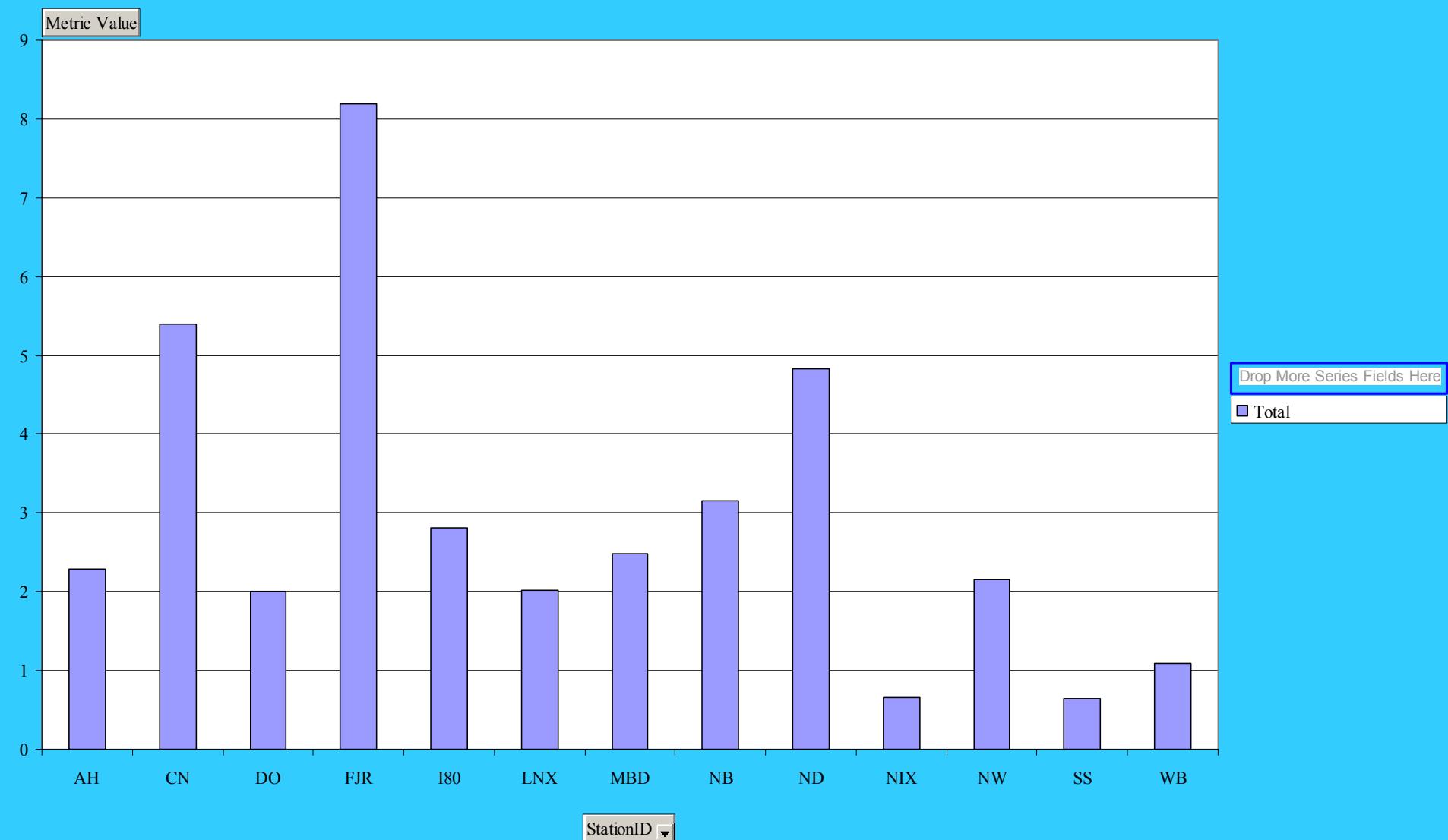
MetricName IntolTax ▾

Total



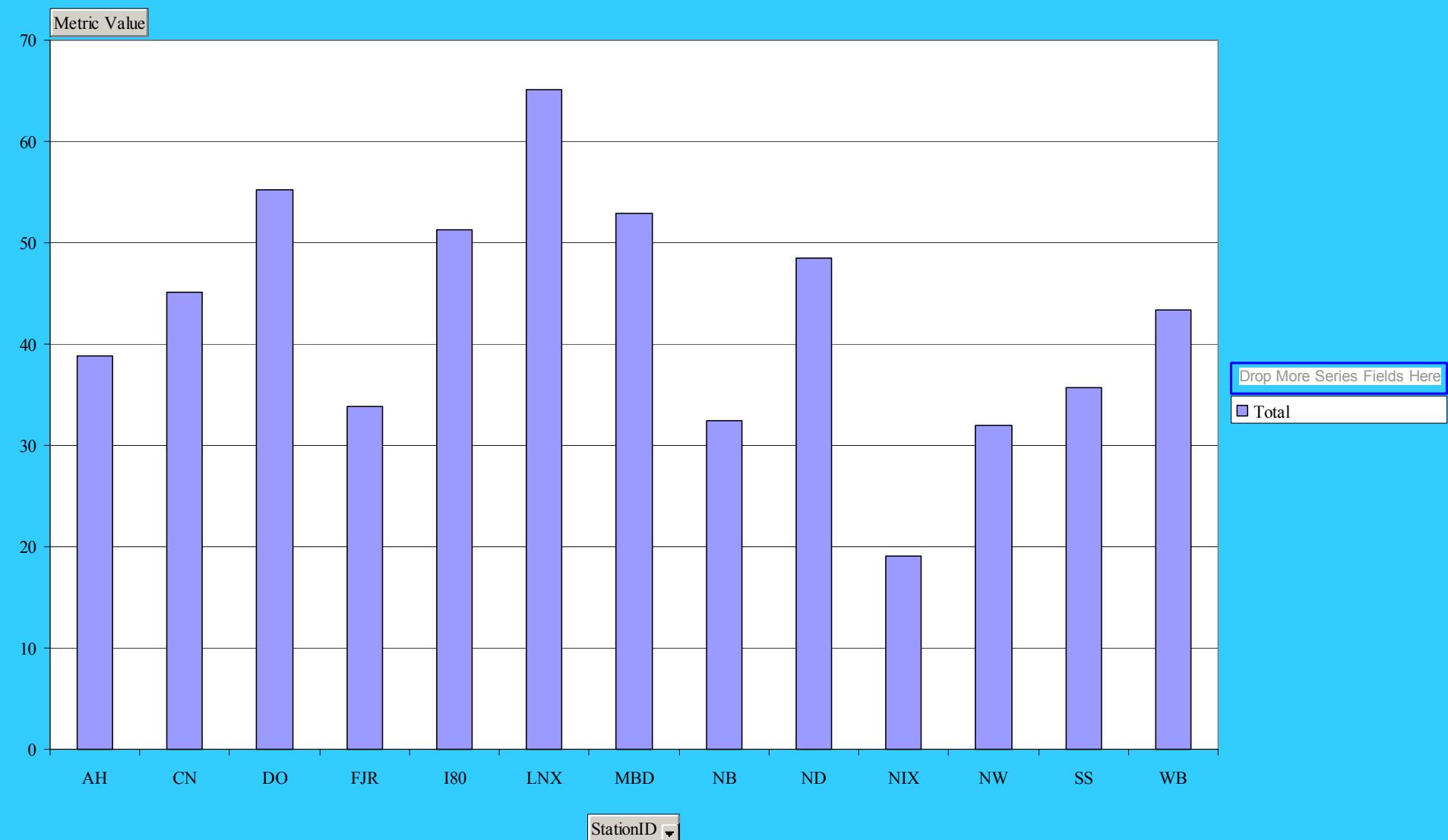
MetricName TolerPct ▾

Total



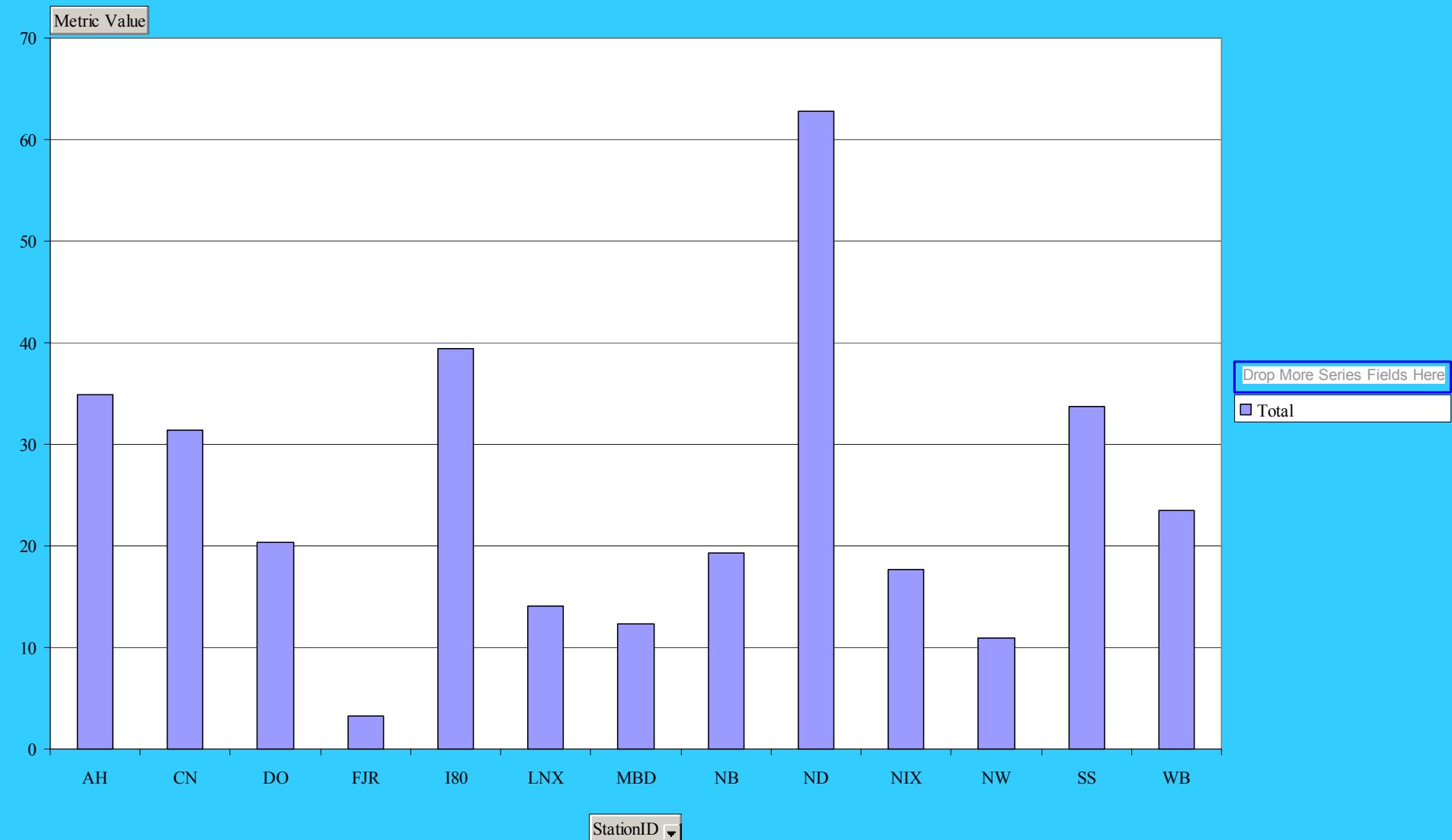
MetricName Dom01Pct ▾

Total



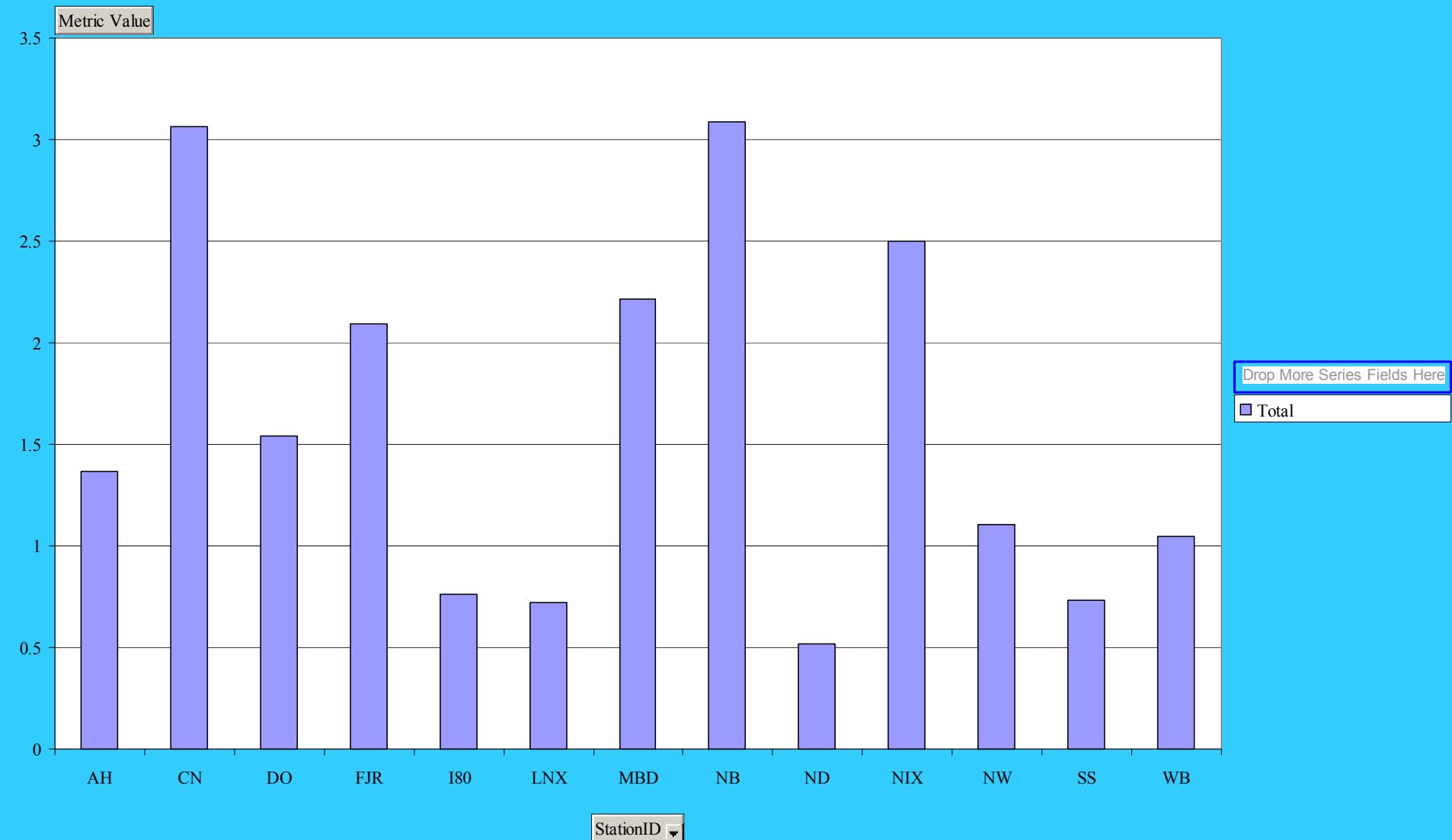
MetricName FiltrPct

Total



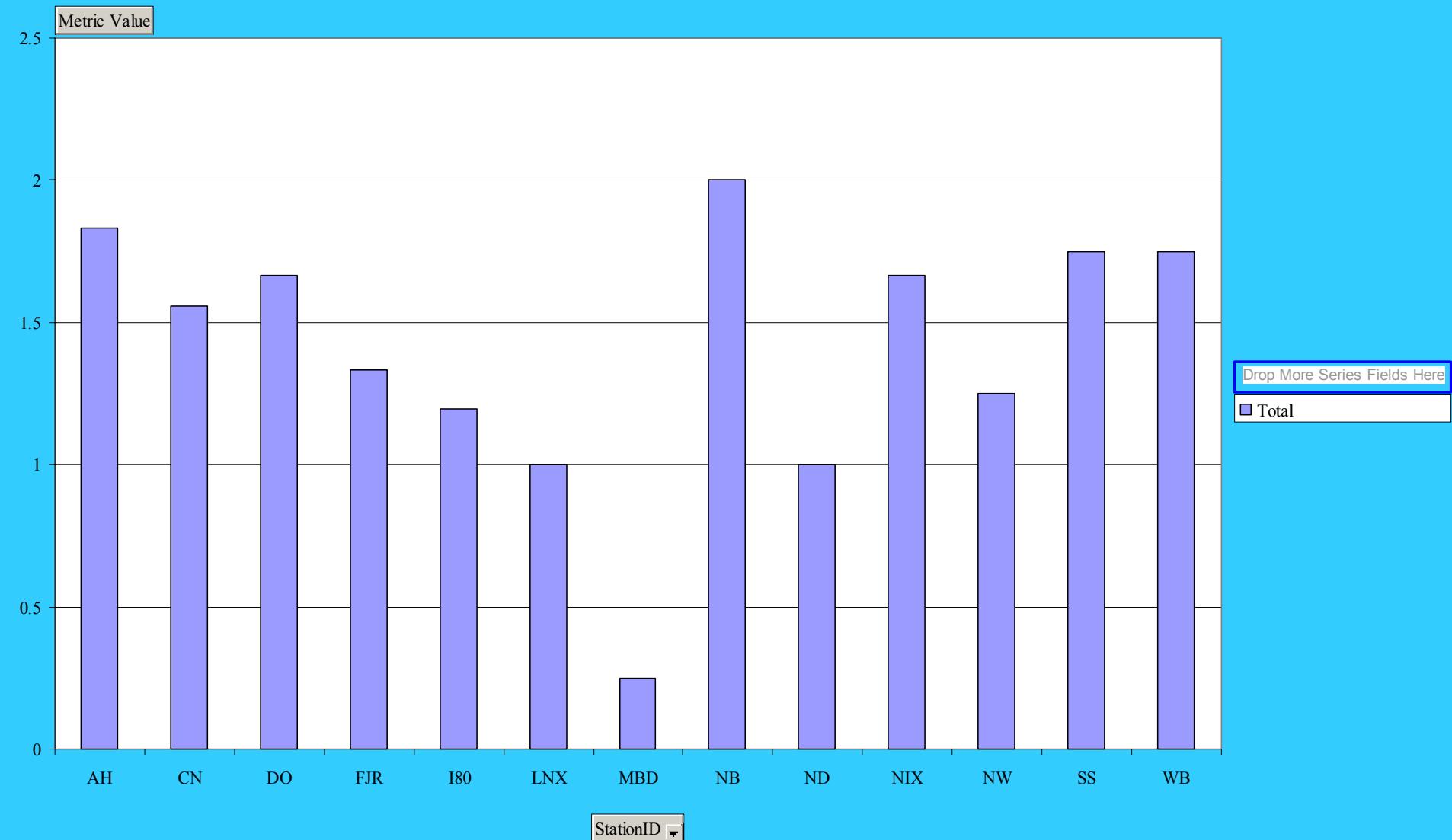
MetricName ScrapPct ▾

Total



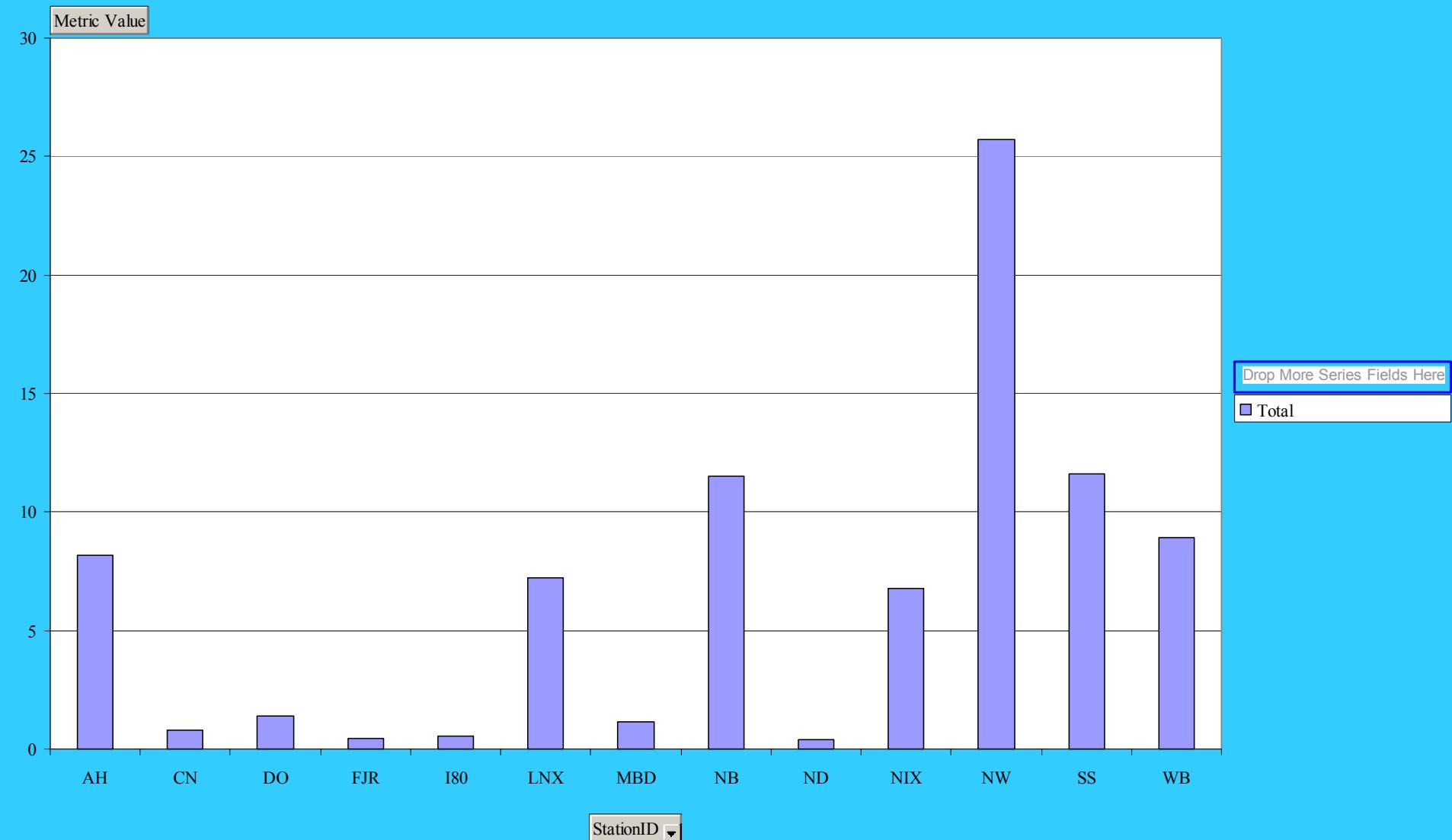
MetricName ClngrTax ▾

Total



MetricName ClngrPct ▾

Total



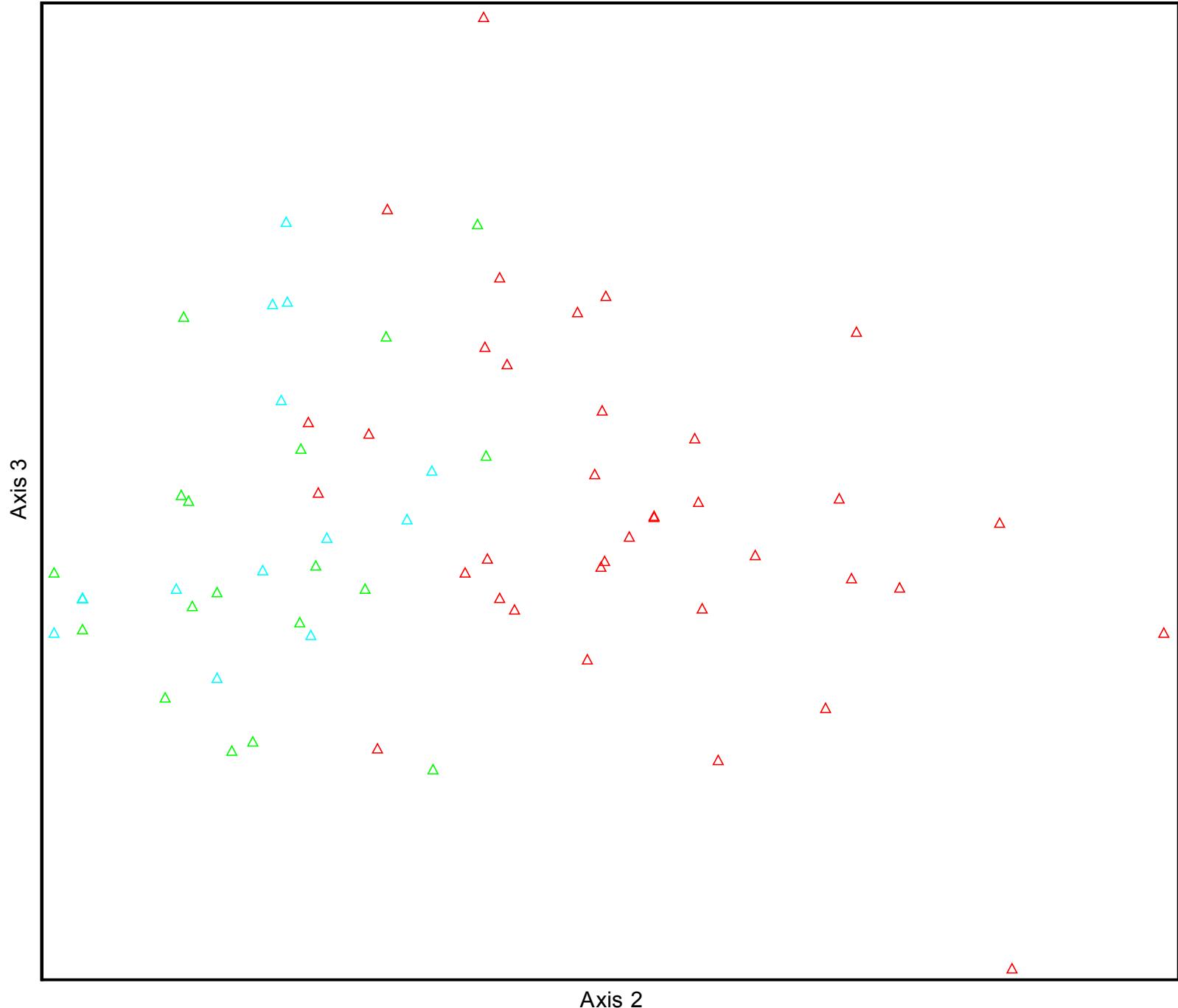
NMDS

- Non-Metric Multi-Dimensional Scaling
- Graph out in ordination space
- Used just the presence and absence of species for each rep and sample for 1996, 1999, & 2000
- Label points by sample year and by station
- Program used was PC-ORD
 - <http://home.centurytel.net/~mjm/>

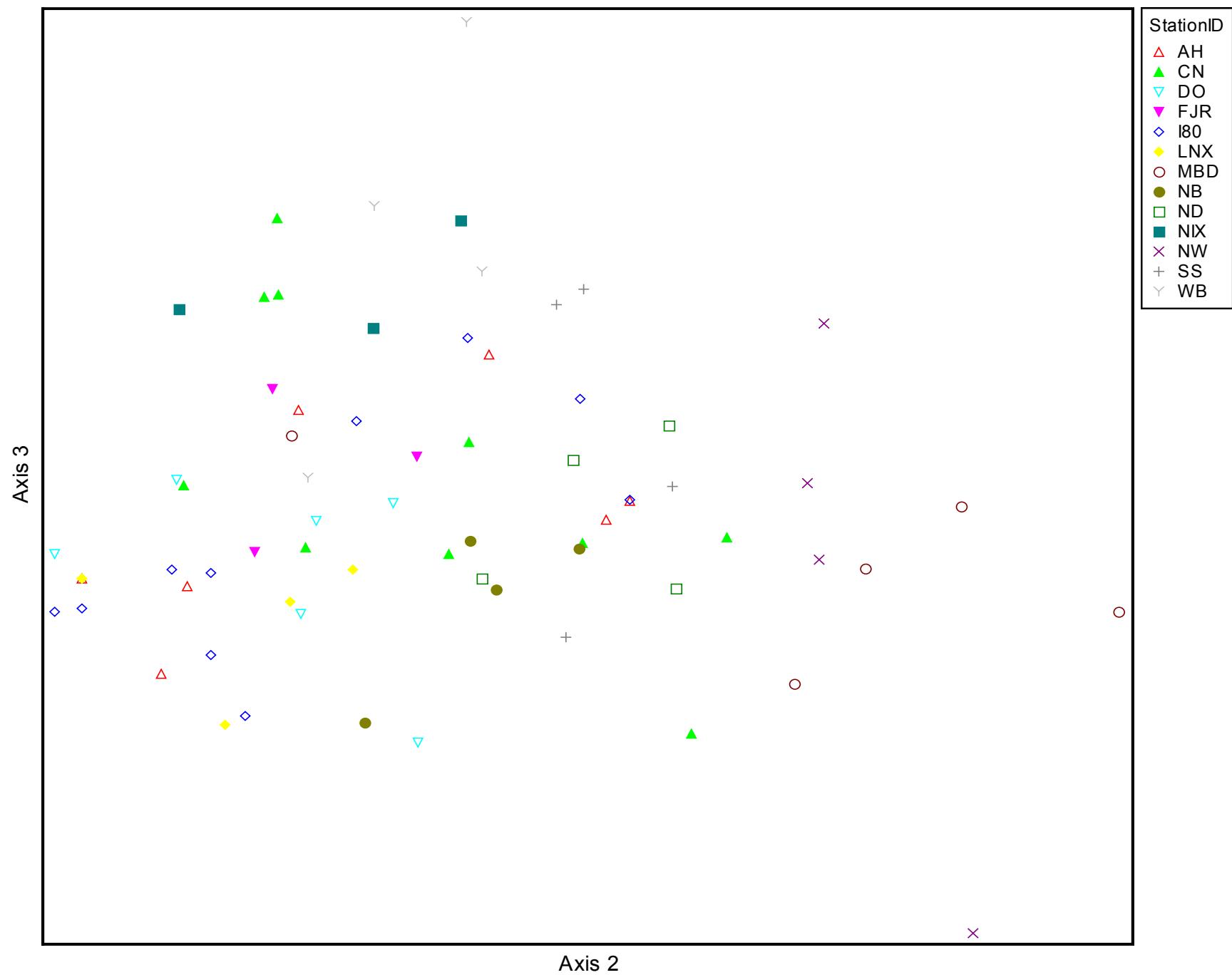
BrayCurtis

SampYear

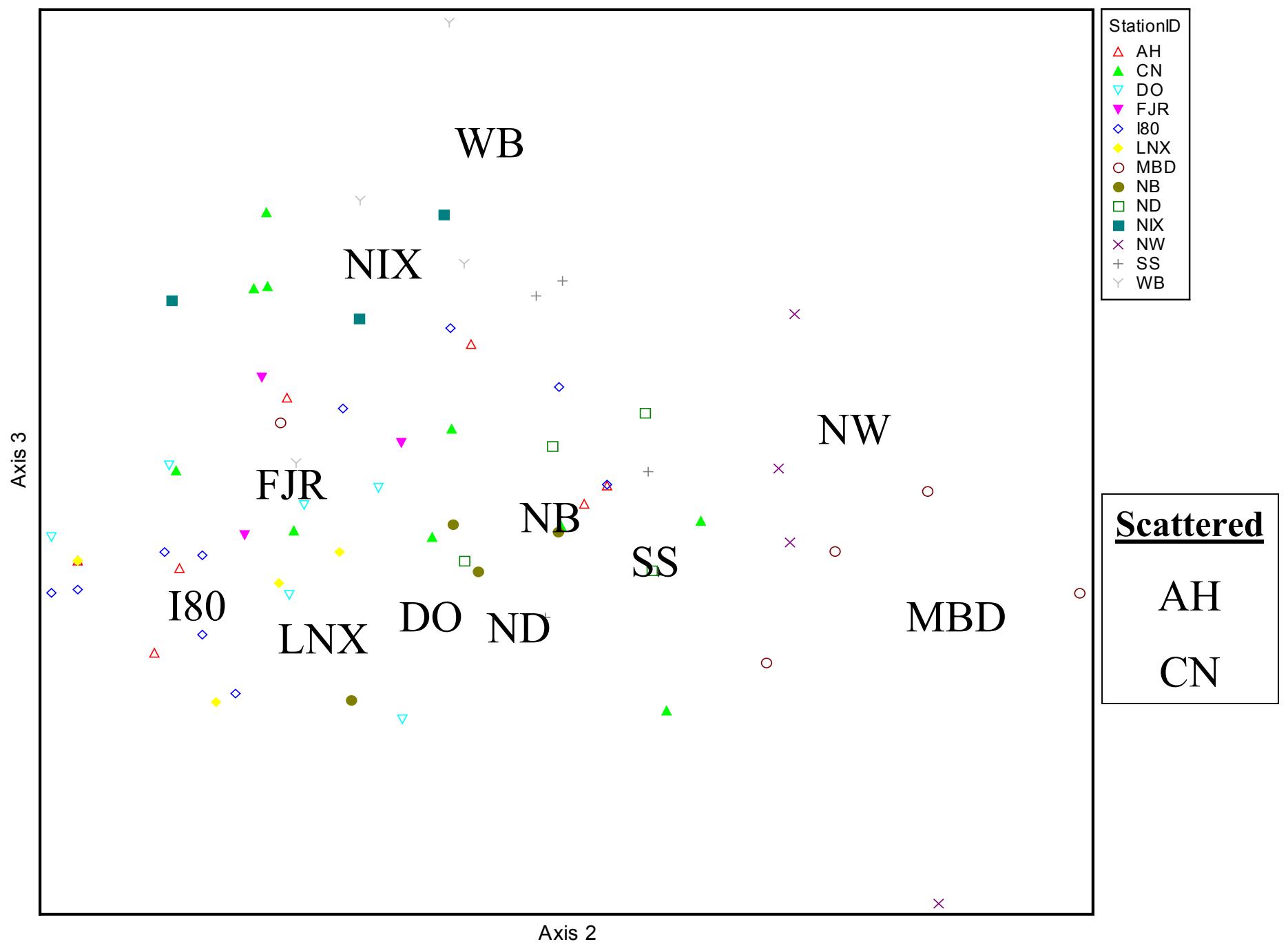
- 1996
- 1999
- 2000



NMDS



NMDS



Recommendations

- Use a standard effort for collections
 - Equipment (Surber)
 - Replicates (3 reps)
- Use a standard effort for identification
 - Total Counts or a standard subsample size
 - Having a standard number of organisms (e.g., 200 or 300) would allow for other types of analyses (e.g., RIVPACS)
- Collect and record non-biological data
 - Physical Habitat assessments
 - Water Chemistry
 - Even just simple parameters would be good
 - pH, DO, Conductivity, & Temperature

Future Analyses

- Comparison of site assessments to reference sites and/or State data
 - Need to designate reference sites
 - Will need to select exclusive of biology
 - Need an Index so can compare
- Look at trends for RBP Recommended metrics at sites over time and within years
 - Not enough sites with multiple years of data